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## **Should non-invasiveness change informed consent procedures for prenatal diagnosis?**

### **ABSTRACT**

Empirical evidence suggests that some health professionals believe consent procedures for the emerging technology of non-invasive prenatal diagnosis (NIPD) should become less rigorous than those currently used for invasive prenatal testing. In this paper, we consider the importance of informed consent and informed choice procedures for protecting autonomy in those prenatal tests which will give rise to a definitive result. We consider whether there is anything special about NIPD that could sanction a change to consent procedures for prenatal diagnosis or otherwise render informed decision-making less important. We accept the claim that the absence of risk of miscarriage to some extent lessens the gravity of the decision to test compared with invasive methods of testing. However, we also claim that the definitive nature of the information received, and the fact that the information can lead to decisions of great significance, makes NIPD an important choice. This choice should only be made by means of a rigorous and appropriately supported decision-making process (assuming that this is what the pregnant woman wants). We conclude that, on balance, consent procedures for NIPD should mirror those for invasive testing, albeit without the need to emphasise procedure-related risk.

**Keywords:** autonomy; decision making; informed choice; informed consent; prenatal diagnosis.

**Abbreviations:**

NIPD (non-invasive prenatal diagnosis)

CVS (chorionic villus sampling)

RAPID (Reliable, Accurate, Non-invasive, Prenatal Diagnosis)

## **Should non-invasiveness change informed consent procedures for prenatal diagnosis?**

### **INTRODUCTION**

Currently, pregnant women in the UK are offered a number of antenatal or prenatal tests, results of which will vary from probabilistic to definite. Of these tests, those that can give a woman or couple a definitive result (that is, virtual certainty about the presence or absence of a particular fetal abnormality)<sup>1</sup> are currently invasive and therefore carry a small but significant risk of miscarriage. However there is a new technology emerging, non-invasive prenatal diagnosis (NIPD), which would allow women to obtain definitive information about their fetus without the risk of miscarriage. [20] The introduction of NIPD could, if made widely available, ultimately bypass invasive testing in pregnancy. Recent empirical evidence has suggested that healthcare professionals regard 'informed decision-making' for NIPD as less important than for invasive testing. [17] In light of this finding, this paper explores the decision-making procedures that ought to accompany NIPD and claims that NIPD should not reduce the emphasis on the gravity of the information that could arise from this testing.

One of the key principles behind prenatal testing is that women are entitled to exercise reproductive autonomy. Informed choice and informed consent procedures are usually considered to protect this. [3] Obtaining informed consent or promoting informed choice for diagnostic tests or screening in

pregnancy is well accepted as standard professional practice and is reflected in guidance in the United Kingdom and elsewhere. [9, 14] Professional deliberations on this topic are less about the appropriateness of women giving consent *per se*; instead the focus is on how to ensure consent and choice are genuine and well-informed. Given there is evidence to suggest that informed decision-making procedures may be threatened by the introduction of the new technology of NIPD [17] and given the wider ethical context of this emerging technology, [1, 2,10] it is timely to critically review the value of informed decision-making in prenatal testing and how this should impact decision-making procedures for NIPD.

In this paper, we argue that the introduction of NIPD should not radically change informed decision-making procedures for definitive prenatal testing. We first briefly describe NIPD and discuss the concepts of informed choice and informed consent. After a brief description of a recent empirical study, we then consider whether there is anything about non-invasive diagnosis that means autonomy should play a lesser role, one that would justify an erosion of, or change to, informed decision-making procedures for prenatal diagnosis. To do this we consider the significance of the absence of risk to the pregnancy that is a feature of NIPD. We also discuss the differences between a decision to test, and the decisions following receipt of results. Included in this discussion is the consideration that the nature of definitive information may have a bearing on a woman's decision whether to undergo NIPD. We also consider the implications of offering NIPD on a 'routine' basis in pregnancy before very briefly considering the policy context.

We claim that the absence of risk in NIPD is a justifiable motivation for a modification to informed decision-making procedures for prenatal diagnosis, in that less time will need to be spent discussing procedure-related risk. However any policy about informed decision-making for NIPD must take account of the definitive nature of the information, the potential impact of the knowledge, and of any action resulting from that knowledge, as these features of NIPD are more akin to prenatal diagnosis than screening (which only provides a risk-based and not a definitive result). This makes decisions about whether to undergo NIPD potentially very important. We conclude that informed decision-making procedures for NIPD do not necessarily need to be as stringent as those for invasive testing methods, particularly if NIPD is to be offered to all pregnant women (as a policy of stringent informed decision-making would have significant resource implications for pre-test counselling). We claim, though, that informed decision-making should be subject to more thorough procedures than non-invasive screening tests, as these provide only probabilistic results.

## **1. CONTEXT OF NIPD AND INFORMED DECISION-MAKING**

### **(a) Clinical Background to NIPD**

A pregnant woman seeking to discover information about the health of her fetus can currently consider several options for prenatal screening or diagnosis. These can be either invasive or non-invasive and will provide a range of information about the health of the fetus. Existing non-invasive

technologies that do not pose a risk to the pregnancy include blood tests to measure levels of certain biochemical markers, or first-trimester ultrasound to assess a risk of Down's syndrome. These are routinely offered to pregnant women as part of antenatal screening programmes.<sup>2</sup> However, NIPD departs from these technologies in that a biochemical test early in pregnancy provides only a probabilistic or risk-based result and ultrasound may provide information that has uncertain diagnostic significance.<sup>3</sup> Under existing practice, more definitive information about the health of the fetus can be obtained using amniocentesis or chorionic villus sampling (CVS), but these are invasive and carry a small but significant risk of miscarriage.

The necessity of risking a pregnancy to obtain a definitive diagnosis about the health of a fetus may soon be removed. Recent advances have given rise to non-invasive testing methods, which can detect cell free fetal DNA (ffDNA) in maternal blood via a blood test. [6] ffDNA is derived from placental cells and crosses over into the maternal bloodstream, circulating as small fragments. These DNA fragments, reliably detected from around seven weeks' gestation, comprise only a small proportion of the overall cell-free DNA (cfDNA) in the maternal bloodstream and are not currently distinguishable from maternal DNA. NIPD therefore detects gene changes not present in the mother, such as fragments of Y chromosome DNA or paternally-inherited gene changes. ffDNA is rapidly cleared from the maternal bloodstream within hours of delivery, making it feasible for use regardless of whether a woman has been pregnant previously. Accurate prenatal diagnosis using NIPD has already been reported for conditions

such as achondroplasia (short stature), cystic fibrosis and x-linked conditions. [19] As techniques that make use of measurements of molecular weight improve, NIPD may also become possible for chromosomal conditions such as Down's syndrome. Additional non-medical applications are also emerging, including commercial prenatal gender and paternity testing. If its reliability is proven, the main advantages of NIPD will be that: it can be undertaken earlier in pregnancy (perhaps before significant maternal-fetal bonding has occurred, and where medical termination may still be possible); and that it is safer than invasive diagnosis. It is essential to appreciate that NIPD would provide information of similar diagnostic power as amniocentesis or CVS, but without the procedure-related risk.

As and when NIPD becomes available, it will have implications for reproductive and public health policies, for example whether it should be used to replace existing screening tests with a diagnostic procedure, whether it will become a new intermediary step between screening and invasive testing or whether it will replace invasive testing altogether.<sup>4</sup> Notwithstanding established professional practices and legal obligations, we might expect the process of NIPD to incorporate a procedure of informed consent or informed choice, particularly given that one of the key motivations for prenatal testing is to allow women to exercise autonomy. In the context of NIPD, exercising autonomy may manifest itself in a number of ways, for example in choosing whether to continue a pregnancy when a fetus has an abnormality and thus planning to care for a child with a



disability or in choosing appropriate options for labour (as is beneficial when a fetus has haemophilia).

### **(b) Informed Decision Making**

For the purposes of this paper, we have assumed that reproductive decision-making is of moral importance. There are four reasons why prenatal informed decision-making is usually valued. First, informed decision-making is instrumental to promoting best interests. Women are usually in a privileged position of knowing their best interests and arguably what is best for their possible future children. Making an informed decision in prenatal testing can lead to better outcomes, such as satisfaction with the decision made. [7] Second, a well-designed informed decision-making procedure can protect women from being deceived or coerced. [12] Third, such procedures exercise respect for autonomy and autonomy is intrinsically valuable. Finally, and more pragmatically, informed decision-making can also protect health professionals from complaints and litigation. [11, 13]

In medical ethics, we tend to describe the process of prior deliberation and agreement to any health intervention as 'informed consent'. In health psychology the terms 'informed choice' and 'informed decision-making' are also used, and these are prominent in literature about prenatal diagnosis and NIPD. For clarity, we will briefly describe the terms 'informed choice' and 'informed consent' and their overlap.<sup>5</sup>

Informed choice and informed consent are both intended to enable individuals to make informed decisions, with the implicit common feature that this is in line with what that individual wants. Informed *consent* is agreement by the patient under conditions that the patient has capacity, is appropriately informed and makes a voluntary decision. An informed *choice* is one that is based on relevant knowledge, is consistent with the decision-maker's values and is behaviourally implemented (enacted). [7] As Marteau explains, informed choice and informed consent differ "in two important ways. First, informed consent is not *explicitly* concerned with the understanding of those *not* consenting". [8, first emphasis added] "Second,... [informed consent] is not explicitly concerned with the consenting individual's values." [8]

While incorporating an individual's values into the notion of informed decision-making has some problems, for example individuals' changing and conflicting values, [8] both choice and consent imply respect for (and protection of) individual autonomy. In this paper we focus on this common attribute. There are procedural and conceptual differences between informed choice and informed consent, but these do not affect the present discussion. We are interested in how to adequately protect autonomy in NIPD using informed decision-making procedures and so use the term 'informed decision-making' to refer to both informed consent and informed choice. The broad conclusion of this paper will therefore apply to both concepts and the conclusions should be meaningful in both bioethics and health psychology. In the following section we will explore possible reasons

why the informed decision-making procedure for NIPD may be less rigorous than for current invasive prenatal testing.

## **2. HEALTH PROFESSIONALS' VIEWS, RISK ELIMINATION AND ROUTINISATION**

### **a) Health professionals' views of informed decision-making for NIPD**

Recent empirical research suggests that, if left unchecked, development of NIPD could lead to an erosion of informed decision-making. [17] Results of a vignette-based survey of 231 UK obstetricians and midwives indicate that this group of professionals believe that there would be less need for formal written consent to NIPD for Down's syndrome (assuming this were available), when compared with invasive prenatal diagnosis. Additionally, respondents believed that the offer and uptake of the test need *not* take place on a different day, creating a 'one-step' procedure. This would be contrary to current practice, in which amniocentesis or CVS is carried out on a different, later day to the initial screening blood test. Any move to this one-step diagnostic procedure would mean only one point of contact between the woman and the healthcare professional, which raises concerns about 'neglecting' autonomy [16] in the sense that the simplicity and speed of the procedure may be favoured over giving women adequate time for reflection, deliberation, and seeking further information if required.

**b) Would the removal of risk sanction an erosion of informed decision-making procedures for NIPD?**

The risks and harms associated with a blood draw necessary for NIPD are minimal, and so the prenatal testing process may now be thought of as technically less problematic and less risky when compared with invasive testing. Studies have shown that decliners of screening sometimes cite the risk of a follow-up test as their reason not to undergo screening. [4] It may be that the clinicians who participated in the study focused on procedure-related risk as the predominant justification for formal written consent and a policy of separate appointments for offer and uptake of invasive testing [personal communication with Lyn Chitty]. Certainly, this would be a plausible argument in favour of less rigorous decision-making procedures for NIPD. This attitude would also echo a previous observation from a screening context, in which the relative lack of procedure-related risk impacts the requirement for women to be given full information and time to reflect. [13] It may also be worth noting that the absence of risk of miscarriage would reduce the scope for healthcare professionals being accused of negligence (i.e. inadequate information that leads to miscarriage). [13]

There may also be an assumption that certainty and information about the genetic status of the fetus are fundamentally good. If so, it may be that the only essential information for women considering the test is that they will receive a definitive answer without risk to their pregnancy. However, it is not necessarily the case that definitive information is always perceived as a

good thing. The definitive nature of the NIPD results may have significant bearing on how a woman perceives her situation and how she wishes to proceed through the remainder of her pregnancy. A probabilistic result would offer some information by providing an indication of the likelihood of the fetus having certain conditions, but would still leave open the possibility that the fetus did not have those conditions. While one woman may undergo further tests to resolve this uncertainty, another woman (particularly one who would not terminate a pregnancy for reasons of congenital abnormality) may not want to know for certain the status of her fetus. She may prefer to remain in a state of hope that her child will not have a particular condition rather than continue a pregnancy with the certainty that the child will. This attitude may prevail even if a no-risk test is available.

Given that information derived from NIPD will be definitive, it may, depending on how NIPD is implemented, remove the opportunity for women to make their next decision (to proceed to definitive testing, or continue the pregnancy taking on board the probabilistic information received) without knowing the exact status of the fetus. That is, women will be making their decision based on much greater certainty as opposed to the probabilistic result from a screening blood test. This may be problematic, as we have already noted. Further, post-test decisions (whether to continue the pregnancy or not) based on certainty are arguably of a different type to those based on probability and this could fundamentally affect a woman's subsequent experience of her pregnancy. The information a woman receives can be extremely important, and might have a significant impact on

the way she perceives her fetus and pregnancy. For these reasons, women should have sufficient time to decide whether they wish to have definite knowledge. This in itself has implications for informed decision-making, as over-emphasising a lack of procedure-related risk may mean that women under-appreciate the certainty that will be forthcoming, and the lost opportunity to accept uncertainty highlighted above.

To consider NIPD as akin to a blood test rather than amniocentesis or CVS would therefore be to regard the avoidance of a risk of miscarriage as the only morally significant dimension to the decision whether to test.<sup>6</sup> When a woman chooses to undergo NIPD, she is participating in a decision to be informed about the genetic status of her fetus. While one woman may use the diagnosis to prepare for having a child with a disability, or to manage her pregnancy and delivery, another woman may terminate the pregnancy on the basis of the information she receives.<sup>7</sup> Unlike current non-invasive methods, the test result will be definitive, which, for those who undergo the test, will remove the option of 'leaving it to chance' whether they bear a child with a disability.

A key aspect to our position is that it is important, psychologically, that women are given time for reflection on whether to undergo testing. It has also been suggested by Scully *et al* that the time taken to deliberate allows individuals to exercise their moral agency. [15] They claim that an individual facing decisions about genetic testing may 'slice up' their decision making to "preserve a cognitive and affective space within which he or she can

continue to perceive the situation sensitively and accurately, and recognise his or her moral responsibilities within it.” [15, p216] It is therefore important that there is appropriate time for reflection, to allow women the ‘space’ to come to their decision.

One possible objection to this cautious approach is that the purpose of the test is merely to gather information, which is not of itself a moral decision. The objection may be that the morally significant decision would be what action, if any, is then taken on the basis of that information. However, we maintain that the decision whether to receive this kind of information in the first place is a moral one. If a woman chose not to receive this information, she would be taking some responsibility for the possibility of bearing a child with a disability. Also, for those women who would consider terminating the pregnancy on the grounds of disability, choosing to receive the information may be to act on the principle that the status of the fetus may have a bearing on whether they would terminate. We claim that on these grounds, the decision whether to receive the information is itself morally relevant. If the decision whether to undergo NIPD is made on the same day as it is offered, some women may find themselves making only a nominal choice about a morally-relevant and non-trivial matter.

### **c) Routinisation**

Having argued that women should be given sufficient time and information to decide whether to receive definitive information about their pregnancy, and that the decision to receive information is a moral one, we have

established that removal of risk of miscarriage is not the only significant change NIPD would bring to prenatal testing.

We will now briefly consider the possible impact of 'routinisation' of prenatal testing via NIPD.

Three relevant aspects of this debate are: (i) the effect of the timing of the process; (ii) whether women may feel there is an expectation to have the test; and (iii) whether lessening the formal decision-making process may be to underplay the importance of the decision.

It may be suggested that the risk-free and relatively simple process of NIPD may encourage 'routinisation', that is a standard offer and uptake of this test by most pregnant women. While routinisation can increase efficiency and improve uptake, it could also potentially undermine the decision-making process. For example, routinisation may further encourage a one-step process in which women may not have sufficient time for deliberation and information gathering.

Second, routinisation may also give rise to an expectation that women will undergo NIPD, as has already been suggested in the context of NIPD [2] and screening. [13, 18] If this was the case, then routinisation may not reflect an appropriately informed decision. Women would need time for reflection to make a well-informed and considered decision that took



account of all of their values, not just those relevant to the risks associated with the procedure.

Third, same-day testing and the removal of written consent may de-emphasise the importance of the decision whether to undergo the test. While NIPD is risk-free and clinically preferable, these features do little to lessen the moral significance of the choice to receive the information. Wrapped up in the choice over whether to undergo NIPD may be values regarding disability, termination, and practical considerations about the family dynamic and whether one is adequately prepared to care for a child with a particular medical condition.

### **3. IMPLICATIONS FOR POLICY**

So far the discussion has not included any particular presumptions as to the model of NIPD that may be introduced into clinical practice. We have, however, focused our discussion on diagnostic testing for all pregnant women. We intend that our recommendations for an intermediary type of decision-making procedure should apply to all NIPD, whatever the model of service delivery that is eventually adopted. Yet we also recognise that while ideally every woman would be given full information, counselling where appropriate, and sufficient time for deliberation, there are resource limitations to achieving such standards. There would be an enormous challenge to resources if NIPD were to become routinely offered to every

pregnant woman were our requirement for comprehensive counselling adhered to. But at the very least, we assert that pre-NIPD counselling and information provision should include providing information about the test when women first book in for antenatal care and then a verbal discussion at the first antenatal appointment, *before* blood is taken at a later appointment. However, a more comprehensive discussion of the exact mode of informed decision-making is currently limited as we do not yet know exactly which model of service delivery for NIPD will be implemented.

#### **4. CONCLUSIONS**

Initial evidence has suggested that health professionals believe the process of pre-test decision-making could change between invasive prenatal diagnosis and NIPD. [17] Pre-test counselling and information provision for invasive testing concentrates, justifiably, on two important aspects: the procedure-related risk of the test and the possible outcome of the test. NIPD will remove the need to discuss procedure-related risk, however it will not alter the information women will receive: that is whether or not a fetus is affected with a particular genetic condition. If decision-making processes for NIPD fail to reflect this, women may, given the non-invasive nature of this test, fail to appreciate the potential significance of the information they may receive.

The procedures relating to informed choice and informed consent for NIPD ought to reflect the importance of autonomous reproductive choice. The clinical simplicity of NIPD, and the fact that it carries no risk to the pregnancy, are good reasons in favour of having straight-forward formal procedures for decision-making. However, we have argued in this paper that the procedure should not be changed radically from existing practice for invasive diagnostic testing. This will require appropriate commitment of resources for pre-test information provision and discussion. This is because, we have claimed, the diagnostic nature of the results may put a pregnant woman in a very different position than probabilistic results would. Further, the results she receives may lead to an important decision of great moral and emotional magnitude. We also claimed that information is not always necessarily a good, and that some women may (entirely reasonably) prefer not to know the genetic status of their fetus.

It is not yet known exactly how (and if) NIPD will be introduced into clinical practice. But however it is offered, the formal decision-making procedure is likely to be slightly different to those for existing methods. We hope to have shown in this paper that while the removal of risk from diagnostic prenatal testing would have a significant positive impact on reproductive choice, there are other important moral considerations that mean the choice whether to undergo NIPD may not be simpler than the choice whether to undergo other non-invasive screening tests during pregnancy.

The challenge is now to translate this debate into a set of practical and relevant recommendations for the introduction of NIPD into clinical practice, taking account of existing arrangements for antenatal care and resource limitations. This will necessitate working with health professionals, recipients of NIPD and relevant policy-makers to produce sound information and resources for wide implementation.

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## NOTES

1. As ffDNA is derived from the placenta, there is a small chance that the genetic information in the maternal bloodstream may not be exactly representative of the foetus
2. We recognise that the 'routinisation' of screening and testing in pregnancy is ethically contentious and has been debated in the ethics literature [5]. However, a substantive consideration of the nuances of the debate over routinisation is beyond the central scope of this paper.
3. For example, a measure of the thickness of the nuchal fold (the thickness on the back of the fetus' neck) that lies on the 99<sup>th</sup> percentile of the normal distribution may have no clinical significance, but it may also indicate a risk of Down Syndrome.
4. Policy on how NIPD is to be offered to pregnant women is not yet determined and is the subject of an ongoing UK national research programme (RAPID: <http://www.rapid.nhs.uk>). NIPD could be offered to (i) replace antenatal screening programmes with a 'one stop' definitive indication of risk; (ii) as an intermediary step between antenatal screening and invasive diagnosis; or (iii) as a follow-up to antenatal screening instead of invasive prenatal diagnosis; in the same way that amniocentesis is offered now. Which of (i) – (iii) is chosen will depend on the success rates for pilot studies of NIPD, financial implications and educational and counselling resources. A determination of the preferred model is therefore inappropriate at this stage and we do not adopt a

preferred model in this paper, although we briefly discuss policy implications in Section 3.

5. Further analysis and comparison of these terms has been undertaken elsewhere. [8]
6. Decision-making on the basis of probability, or uncertainty, can be problematic for different reasons. Making a decision on the basis of uncertain information involves a risk analysis. It is possible, for example, that a woman could terminate her pregnancy on the basis of the probability that the fetus carries a certain genetic condition, only to find that in fact the fetus did not have that condition. Indeed, avoidance of such problems of uncertainty forms part of the appeal of NIPD.
7. This will, of course, depend on the clinical utility and validity of this test, and women's acceptance of its reliability.

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